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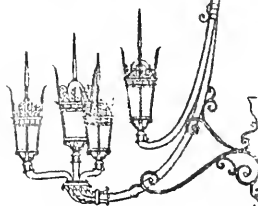
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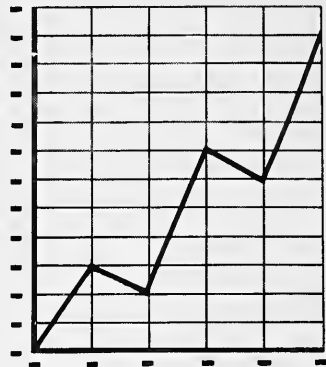


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EMPLOYMENT AND MANPOWER REQUIREMENTS IN THE CORE 1950 - 1990

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PREPARED BY
METROPOLITAN AREA PLANNING COUNCIL

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1950-1990



Prepared by

METROPOLITAN AREA PLANNING COUNCIL

September, 1967



Prepared by

METROPOLITAN AREA PLANNING COUNCIL

in cooperation with

Massachusetts Department of Commerce and Development

Massachusetts Bay Transportation Authority

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and with the

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1. Introduction

The purpose of this report is to provide a comprehensive overview of the current state of research in the field of artificial intelligence (AI) and its applications. This report will explore the various sub-fields of AI, including machine learning, natural language processing, and computer vision, and discuss the challenges and opportunities associated with their development and deployment.

In the following sections, we will first introduce the basic concepts and terminology of AI, then discuss the historical development of the field, and finally explore the current state of research and the future prospects of AI.

The first section, "Basic Concepts and Terminology," will define the key terms and concepts used throughout the report, such as "artificial intelligence," "machine learning," and "deep learning."

The second section, "Historical Development of AI," will trace the roots of AI back to its origins in the early 20th century and discuss the major milestones and breakthroughs that have shaped the field over time.

The third section, "Current State of Research," will provide a detailed overview of the latest research findings in the field of AI, focusing on the most active and rapidly evolving areas of study.

Finally, the fourth section, "Future Prospects of AI," will discuss the potential impact of AI on society and the economy, and explore the challenges and opportunities that will arise as AI continues to advance.

Throughout the report, we will use a variety of examples and case studies to illustrate the concepts and findings discussed, and we will provide references to the relevant literature and research papers.

We hope that this report will provide a valuable resource for anyone interested in the field of AI, and that it will help to advance our understanding of this exciting and rapidly changing technology.

FOREWORD

The Metropolitan Area Planning Council presents herewith a study of the Employment and Manpower Requirements in the Core (Boston, Brookline, Cambridge, Chelsea, Everett, Somerville) in the period 1950-1990. (*) While this study shows a reasonably sound economy and indicates continued growth, there are a number of problem areas with which the Core municipalities must concern themselves.

They involve the decline in employment and an even greater decline in the labor force in the Core; the changing nature of economic activity and, with it, the shifts to occupations which require higher skills. This study points up underlying ^{for} needs/continually improving the quality of education in the Core, for recasting and improving vocational training, for establishing two-year colleges and for providing publicly supported education at the university level.

In addition, renewal and rehabilitation must be pursued vigorously; industrial programs must be expanded and transportation facilities must be improved and enlarged.

The problems of the Core are many and complex but they can be solved and their solution will be easier and ~~more~~ effective if the communities work ~~together~~.

(*) It should be emphasized that the term "Core" does not refer to the City of Boston alone or to any of its sub-areas, but rather to six-community area as described.

SUMMARY

The Core, as it is used in this report, is made up of five cities -- Boston, Cambridge, Chelsea, Everett and Somerville -- and the Town of Brookline. These six communities are the heart of the Region. Because it has one-third of the Region's population and provides more than 40 percent of the Region's employment it warrants special attention.

EMPLOYMENT: Employment in the Core has been declining since the end of World War II while the rest of the Region has experienced substantial employment growth in the same period. Projections indicate a substantial slowdown in the postwar trend, so that, by 1975, there will be only 23,000 less jobs than at present, or a loss of only 4.2 per cent, compared to a postwar decline of 12.8 per cent. Changes in the economic structure offer an opportunity for a reversal in trend after 1975, so that, by 1990, employment could be 3 per cent higher than in 1950.

The nature of economic activity in the Core has been changing and will continue to change. Manufacturing will continue to decline and, within manufacturing, there will be a shift toward the higher skilled and more sophisticated industries such as instrument manufacture. Non-manufacturing activities - services, government, real estate, finance and insurance - will continue to expand.

By 1990, the Core will require on the order of 40 million square feet of new or rehabilitated space to meet the employment growth opportunities. One-third to one-fourth of this space will be required by 1975. These needs take into account not only growth of various activities, but displacement by public works. In the City of Boston alone renewal and highway construction by 1975 will eliminate in the vicinity of 9 million square feet of floor space, half of which will be in manufacturing and wholesaling activities.

OCCUPATIONAL REQUIREMENTS: Shifts in the structure of industry in the Core will result in a change to occupations which require higher skills and employ so-called white-collar workers. Clerical and professional-technical employment will grow in importance to the extent that, from 1960 to 1975, more than one-half of those entering the labor force will be in these two categories. Larger numbers of women will be employed. This means a high turnover of jobs and equally high

replacement requirements.

LABOR FORCE: Population in the Core has been declining since the end of World War II. This means a smaller resident labor force. Since the decline in the labor force has been greater than the decline in jobs there has been an increase of daily commuters in the Core. This will continue so that, by 1975, commuters are expected to make up more than 40 percent of Core employment, up from 38 percent in 1960.

Concomitant with the shift toward white-collar occupations will be an increasing requirement for well educated workers. Yet the educational level of the Core population is considerably lower than that of the suburbs. In general, the dropout rate among those of high school age today is higher in the Core than in the suburbs. Also, Core residents over 25 years of age have a higher proportion of high school dropouts than do suburban residents in the same age group. As a result, the Core labor force is subject to higher unemployment than the suburbs and a large portion of the unemployed are youth and young adults under 25 years of age.

The labor demand and the supply of qualified Core residents will not be in balance. In a period during which the Region will be experiencing full-employment and an extremely tight labor market situation, many Core residents will not be capable of participating in manpower and industrial development without sustained enlargement of public and private efforts.

RECOMMENDATIONS

Education: Programs for the continual improvement of the quality of education in the Core schools, are major requirements if all Core residents are to benefit from, and participate in, economic change. Such programs would also decrease the middle-class flight to the suburbs.

Several approaches deserve strong consideration:

1. Improve the elementary school curriculum and incorporate the gains provided through Head Start into the main elementary school system.
2. Establish one or more regional technical high school districts.

3. Establish a Core-sponsored science supplementary educational center under Title III of the Elementary and Secondary Education Act of 1965.
4. Establish a post-high school 2-year occupational training system.

Manpower: A comprehensive manpower development plan for 1975 including essential supportive services should be prepared. This long-range plan should have annual components which should be integrated with the annual metropolitan plan prepared by a Federal-State interagency coordinating committee.

Industrial Development: Without adequate job opportunities in the Core, many of its residents will be unable to find employment commensurate with their skills. The substantially improved employment situation projected for 1975 and beyond will not occur automatically. A variety of public programs aimed at providing and enhancing private investment opportunities is mandatory, in order to provide over the next quarter century, an estimated 40 million square feet of new or rehabilitated floor space.

Among the approaches which would appear to be required if the Core communities are to realize opportunities are:

1. Demonstrate Core interest in business development by creation of a "one-stop" service to business dealing with zoning, off-street parking, expansion plans, and other matters, perhaps operating out of the mayors' offices.
2. Creation of a regional development corporation.
3. Consideration of the creation of a six-community industrial development finance agency in the event the local industrial revenue bond legislation passes.
4. Rehabilitation of industrial-commercial buildings.
5. Identification of appropriately located, publicly owned surplus land and air rights over expressways or local streets and their reservation for industrial uses.
6. Enlarged industrial-commercial-renewal programs to make land available for expansion.
7. Up-grading and modernization of major business centers.
8. Improvement of transportation facilities (including parking) and rapid completion of proposed MBTA extensions.

Introduction

The Core, comprised of six communities at the Center of the Eastern Massachusetts Region,⁽¹⁾ plays an important role in the life of the Region.

Since the Core (Boston, Brookline, Cambridge, Chelsea, Everett and Somerville) provided 43 percent of the Region's employment in 1963, and contained one-third of the Region's population in 1960, it warrants special attention in studying the Region.

In this report on the Core two factors are given special attention: employment and labor force. By examining these two factors and projecting them to the years 1975 and 1990, it will be possible to make judgments regarding:

- the educational and other requirements needed in the labor force;
- the adequacy of the labor supply for the Core; and,
- the adjustments that may be necessary to balance labor demand (employment) and labor supply (labor force).

(1) The Eastern Massachusetts Region is composed of 152 cities and towns lying within a 30-35 mile radius of the State House. See map on following page

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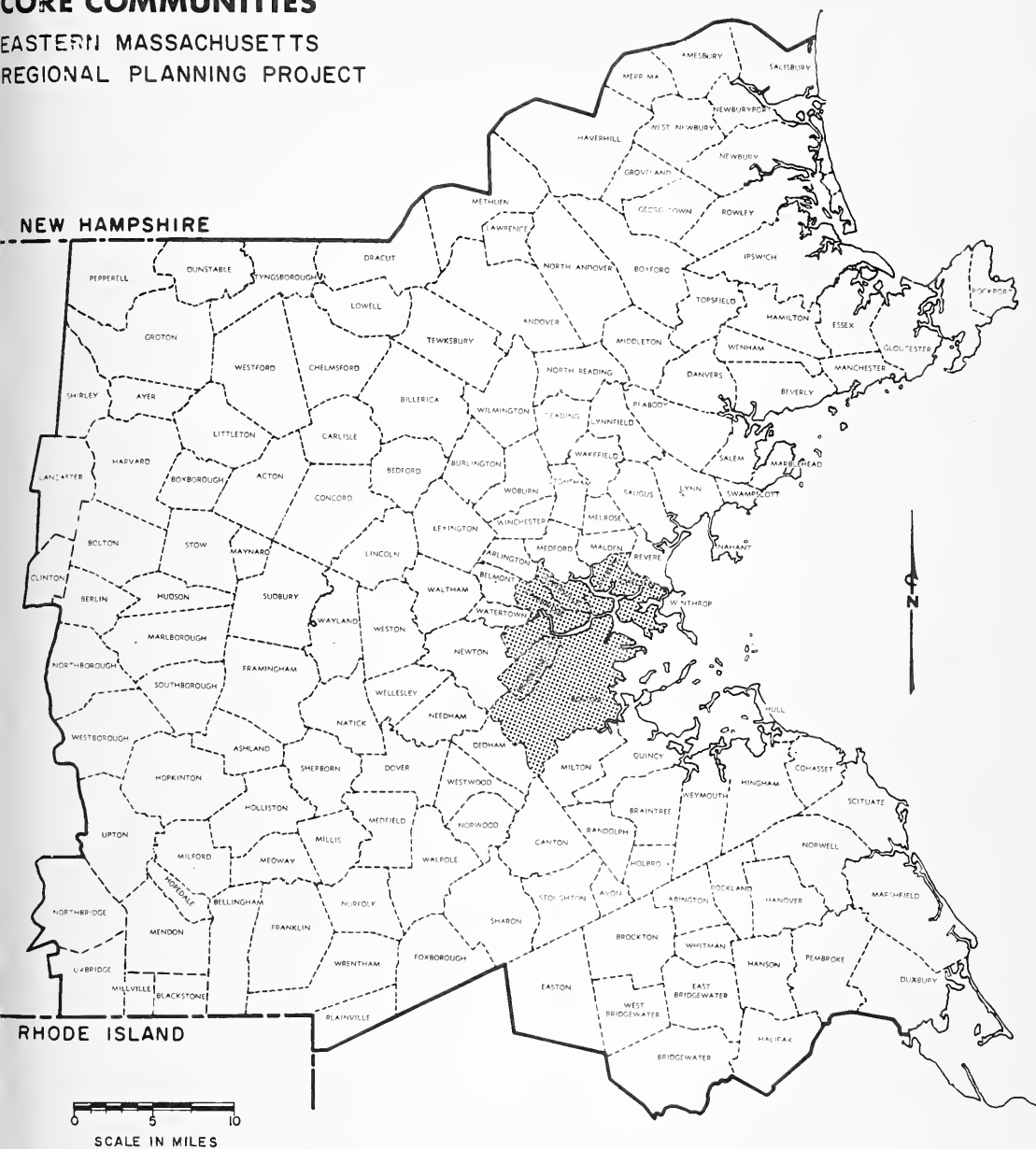


TABLE 1

ESTIMATED AND PROJECTED EMPLOYMENT FOR MAJOR INDUSTRY GROUPS
IN THE PLANNING AREA AND THE CORE
1950, 1963, 1975, 1990

(thousands of employees)

Industry Group	1950		1963		1975		1990	
	Plan'g Area	Core	Plan'g Area	Core	Plan'g Area	Core	Plan'g Area	Core
TOTAL	1128.4	631.6	1278.0	552.3	1502.4	529.4	1798.3	650.9
MANUFACTURING	405.0	184.1	394.0	124.0	433.5	97.2	478.7	106.0
Durables	149.0	73.2	199.9	49.9	231.5	42.8	267.9	48.8
Non- Durables	256.0	110.9	194.1	74.1	202.0	54.4	210.7	57.2
NON-MANUFACTURING	723.4	447.5	884.0	428.3	1068.9	432.2	1319.6	544.9
Min'g & Constr.	54.1	29.0	57.9	23.8	65.4	21.8	79.1	26.5
Trans., Commun. & Utilities	68.9	46.9	70.0	38.8	72.8	36.4	76.2	37.0
Trade	257.3	166.3	283.2	127.0	344.4	117.7	397.5	138.3
Finance, Insur. & Real Estate	55.7	51.0	81.3	60.1	104.7	62.1	152.3	89.3
Services	133.2	109.4	210.7	121.5	268.7	114.7	362.7	160.8
Government	154.2	44.9	180.8	57.1	212.8	79.5	251.8	93.0

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EMPLOYMENT

Between 1950 and 1963, employment in the Core declined from 631,600 to 552,300. Projections of the Core Employment opportunities as a share of Eastern Massachusetts economic activity indicate that the downward trend will be substantially dampened through 1975 with total employment only falling to a level of 529,400. (*) Between 1975 and 1990 the trend could be reversed with employment reaching 650,900 in 1990, or 3 percent higher than the level of 1950. (See Table 1.)

At the same time, there has been a shift from manufacturing employment to white-collar employment in non-manufacturing industries. While this shift has occurred throughout the Region, the extent of the shift has been greater in the Core: between 1950 and 1963, manufacturing employment declined by 33 percent in the Core, and only by three percent in the Region. During the same period, Core employment in three non-manufacturing industries alone (Government; Services; Finance, Insurance and Real Estate) increased from 32.5 percent to 43.2 percent of total Core employment.

Projections indicate that this structural shift will continue, so that by 1975 manufacturing will account for only 18.4 percent of total employment in the Core, compared to 22.5 percent in 1963. During this same period, non-manufacturing employment will increase by one percent, due mainly to a rapid growth in government employment, and account for nearly 82 percent of total employment.

(*) For a statement of basic assumptions and methodology for Eastern Massachusetts, see Economic Base and Population Study, Volume II.

Manufacturing

From 1975 to 1990, employment in Core manufacturing industries will increase, with the major growth occurring in those industries which had increased employment between 1963 and 1975.

Over the entire projection period (1950-1990), the relative importance of manufacturing employment will decline by 56 percent in the Core, and by 25.6 percent for the entire Region (Table 2).

Table 2

MANUFACTURING EMPLOYMENT AS A PERCENT OF TOTAL EMPLOYMENT
IN THE PLANNING AREA AND THE CORE

<u>Area</u>	<u>Percent Manufacturing Employment</u>				<u>Percent Change</u>
	<u>1950</u>	<u>1963</u>	<u>1975</u>	<u>1990</u>	<u>1950-1990</u>
Planning	35.9	30.8	28.9	26.6	-25.6
Core	29.1	22.5	18.4	16.3	-56.0

Employment will shift away from the traditional Core manufacturers - Food Processing, Textiles and Apparel - as these activities are projected to continue. In addition to Instruments, which also expanded during the period 1950-63, employment growth opportunities in Printing, Fabricated Metals, and Electrical Machinery are projected for the 1963-1990 period.

Non-Manufacturing

Between 1950 and 1963 non-manufacturing employment in the Core declined by four percent, or 19,000 jobs, while the region's non-manufacturing employment increased by more than 22 percent during the same period.

A gain in Core employment is projected, so that by 1990 there will be an increase of almost 117,000 non-manufacturing jobs, a growth of 27 percent over 1963.

By comparison, growth of non-manufacturing jobs in the region is expected to increase by nearly 50 percent or almost 436,000 employees over the 1963 level.

As manufacturing has declined in relative importance, the share of total employment accounted for by non-manufacturing activities in both the Region and the Core has increased. Table 2 shows that the proportion of total employment in non-manufacturing activities is greater in the Core than in the Region.

a. Construction

Construction employment has been declining so that, between 1950 and 1963, the Core lost 4,500 employees. By 1990, it is expected to gain some 2,700 employees more than in 1963, an increase of 11 percent. However, the 1990 level of construction employment will still be below that of 1950.

The Region, on the other hand, is projected to have a steady increase in construction employment. By 1990, there

will be 21,000 more employees than in 1963, an increase of 36 percent.

(2)

b. Transportation, Communications and Public Utilities:

Between 1950 and 1963 employment in the Core industries declined by 13 per cent. Projections indicate a continued loss but at a much slower rate to 1975 and thereafter a small gain. Within the Region employment will continue to increase slightly.

Nevertheless the Core historically has exceeded the growth of the Boston Region in one industry, communications. Continuing growth of this industry is anticipated, minimizing the overall loss within the Core area.

However, the severe competition within the Core for women workers and the resultant pressure on wage rates may cause this activity to expand well outside of the Core.

c. Trade

From 1950 to 1963, the decline in Core population, the development of suburban shopping centers and the rapid growth of chain supermarkets at the expense of the small individually-owned stores were factors contributing to the loss of 31,000

(2) Railroad employees (SIC 40) are excluded from this category due to the problems of distributing railroad employees among sub-areas (such as the Core) of the Region.

jobs (28 per cent) in retail activities. Wholesaling during this same time period declined by 8,000 jobs or 14.5 percent. Between 1963 and 1990 a modest increase of 9 percent, or 11,000 employees, is projected. All of this growth is expected to be accounted for by the wholesale category since retail employment is not expected to regain its 1963 level by 1990.

This decline in retail employment may very well occur despite signs of renewed confidence of trade potential in Boston which is reflected in Raymond's expansion plans, Prudential and the Columbia Point Shopping Center. Much of the employment taking place in these developments does not represent net gains to the Core, but rather a transfer of employment from one site to another. While it is difficult to predict the net employment effect of downtown urban renewal activity, employment in retail activities may continue to decline slightly as improvements along lower Washington Street displace many marginal establishments. Nevertheless, it is expected that the downtown and Back Bay shopping-office complexes will be economically stronger and more viable as a result of improvement programs presently underway.

In comparison, the Region will continue to expand in this category so that by 1990 employment will have increased by 40 per cent over the 1963 level.

d. Finance, Insurance and Real Estate

This is one activity in which Core employment grew during the postwar years. It is estimated that by 1990 there will be 29,000 more employees in finance, insurance and real estate than in 1963.

Compared to the Region, however, the Core will still lag: between 1963 and 1990, the Core will grow by almost 49 per cent in finance, insurance and real estate, while the Region will increase by 87 per cent.

e. Services:

In service employment the Core will show an increase, but at a much slower rate than the Region. Between 1963 and 1990 service employment in the Region is projected to increase by 72 per cent while the Core will increase by only 32 per cent.

In certain industry groups the Core is projected to maintain its position relative to the Region. Specifically these growth industries are business services, education, and miscellaneous services.

By 1990, the Core is expected to exceed its 1963 level of service employment by some 39,000 employees. Of this total, medical services will account for 19,000 employees, higher education 12,000, and miscellaneous services (of which the most important are engineering and architectural services), 8,000.

f. Government

Government employment in the Core is projected to grow from 57,100 in 1963 to 93,000 in 1990, an increase of 63 per cent. This rate of growth will exceed that projected for government employment in the Region as a whole. Most of the Core growth will result from increases in federal and state government employment including such new facilities as the NASA Electronics Research Center. Gains at the regional level (excluding the Core) will be largely the result of growth in local government employment.

MANPOWER REQUIREMENTS

The previous section of this report projected employment and labor demand on the basis of historical trend. This section of the report is concerned with determining the extent of labor supply in the Core and the scope of adjustments that will be needed to reach a balance between the two.

Labor Force Commutation

In 1960, the employed Core labor force was 428,700, of which 91,700 found work outside of the Core. Employment in the Core was 549,700. The difference between employment and resident labor force working in the Core is the number of suburban commuters to and from the Core.

Since the Core provides 43 percent of the Region's employment and has only one-third of the Region's population, it is obvious

that a large number of suburban residents work in the Core. In 1960, 192,700 suburbanites commuted to the Core to work. Conversely, 91,700 Core residents worked outside the Core. (See Table 3).

TABLE 3
LABOR FORCE COMMUTATION PATTERNS,
CORE AND SUBURBS, 1960 and 1975

	<u>1960</u>	<u>1975</u>
Core Employment*	529.7	501.9
Less Suburban commuters	<u>192.7**</u>	<u>182.6**</u>
Jobs Available for Core Residents	337.0	319.3
Employed Core Resident Labor Force	428.7	379.6
Less Resident Out-Commuters	<u>91.7**</u>	<u>81.2**</u>
Residents Available to Working in Core	337.0	298.4
Difference between Available Jobs and Available Labor Force	0	+20.9
Unemployment	20.9	14.1
Rate	4.6%	3.6%
Change 1960-1975		
Core Employment	-27.8	
Core Resident Labor Force	-49.1	

*Employment as used in this table was adjusted from a job count to a head count by an allowance of multiple job holding of 5.2 percent.

**1960 Estimates, Suburban commuters was derived as a residual. In-commutation as a proportion of all jobs was 36.8 percent. This rate was assumed for 1975. 1960 estimates of resident out-commuters was derived from the 1960 U. S. Census. The out-commuting rate was assumed also for 1975.

Population, and therefore labor force, is projected to decrease much more rapidly than employment in the Core through 1975. Therefore, a continuation of 1960 commutation rates will not provide a balance of labor force and employment by 1975, but would result in a surplus worker demand exceeding supply by 20,900 jobs.

The importance of the projected excess Core demand for workers

is that it provides a very favorable setting in which to reduce unemployment. This favorable situation can be expected to prevail over the next 7-8 years. The critical question, irrespective of whether the assumed 3.5 percent unemployment rate for 1975 is too optimistic, is, will the Core residents be able to compete successfully for available jobs? There is every reason to expect suburbanites to commute into the Core in increasing numbers, as has occurred in the past, if the demand for workers exceeds the qualified supply of Core resident labor force. Of course, should commutation patterns change significantly because of increasing job opportunities in the suburbs, this would have serious implications for Core employers. There also is the possibility that the Core will realize something considerably less than the projected level of employment. The latter eventuality would be most undesirable as it would compound present social problems of the Core.

If the projected rate of 3.6 percent is to be realized as well as the expanded opportunity to reduce unemployment even below that level, then action must be undertaken to both prepare Core residents for employment and to assure them that jobs will be available. Manpower development must be based upon an understanding of the demand for various occupations.

Occupational Structure

In 1963, 39 percent of the jobs in the Core were in the professional-technical and clerical categories while the "blue collar" categories accounted for only 29 percent of the jobs. Service, sales, and miscellaneous occupations accounted for the balance of

employment.

In contrast, the Core resident labor force is found predominantly in blue-collar and service occupations. Only 33 percent of the Core resident labor force was in professional-technical and clerical occupations in 1960, while nearly 34 percent was in "blue-collar" occupations, and another 33 percent was in managerial, sales, service and miscellaneous occupations, with the service and miscellaneous occupations accounting for most of this. (See Table 4).

Blue-collar, service and miscellaneous categories are dominated by occupations requiring low level of skill, training, or education.* Clearly, the occupational structure of the Core resident labor force is out of kilter with the present pattern of demand by business and industry.

*The major exception to this are the craft occupations which are dominated by the construction trades.

TABLE 4

COMPARISON OF OCCUPATIONAL STRUCTURE
BY JOBS AND RESIDENT LABOR FORCE
(Percent Distribution)

	Occupation Distribution Resident L. F. 1960	Occupation Distribution Based on Jobs in Core 1963
	<hr/> (%)	<hr/> (%)
Professional	12.7	16.4
Managerial	5.8	9.9
Clerical	20.4	23.0
Sales	6.6	9.7
Craftsmen	11.3	11.5
Operative	18.3	14.5
Service	12.4	9.8
Laborers	4.0	3.2
Miscellaneous*	8.5	2.0

*In the 1960 U. S. Census a very high proportion of central city residents failed to specify their occupations and were identified in U. S. Census publications as occupations not reported. There is good reason to suspect that most of these occupations not reported involve very minimal skills.

A good education is increasingly becoming the key that opens the door to the world of work. While many older adults have developed valuable skills as a result of entering the labor force when education was not as critical, many will remain vulnerable to changes in work tasks that may require higher levels of reading, arithmetic and writing skills than they now possess. An indication of the educational handicap facing many Core residents as they compete with suburbanites for jobs in the Core and elsewhere in the region is shown in Table 5.

TABLE 5

EDUCATIONAL LEVELS, 1960 POPULATION

25 AND OVER

		<u>Suburbs</u>		<u>Core</u>	
		Number	%	Number	%
No School		15,395	1.7	22,373	3.6
Elementary	1-4	18,260	2.0	23,154	3.7
"	5-7	60,507	6.7	62,746	10.1
"	8	108,107	12.0	101,188	16.3
High School	1-3	168,028	18.7	128,632	20.7
High School	4	302,723	33.7	178,806	28.8
College	1-3	111,457	12.4	48,121	7.8
	4+	114,807	12.8	55,232	8.9

In 1960, only 28.8 percent of the Core population over 25 years of age had completed high school, compared to 33.7 percent of this age group in the suburbs. Even more significant is the fact that more than one-third of the Core population over 25 had not even been to high school, compared to one-fifth in the suburbs. Similarly, the number of college graduates in the over-25 population in the suburbs is more than twice that of the Core.

Some of the difference in the educational attainment of the population is due to its age structure. Education has been more available to the younger members of the population. There are indications, however, that the current student population in the Core has a large proportion of high school drop-outs. This indication comes from the experience of job training programs organized by the Action for Boston Community Development in Boston. Demand for these programs has been considerably greater than anticipated by a ratio of almost four to one.

Occupational Change 1963-1975

What are the occupational prospects in the Core between now and 1975? There are two aspects to this question which need to be examined. First, there is the need to have a picture of what the prospects are for total employment by occu-

pation in 1975, and the major industries in which such occupational opportunities will be found. Second, there is the fact that the demand for any given occupation is also influenced by the need to replace workers who retire or die.* These two factors in combination provide guides for manpower training and development.

The level and change in employment by occupational structure between 1963 and 1975 is shown in Table 6. Professional-technical employment will grow rapidly and account for nearly one-fifth of all employment in the Core in 1975. The employment of operatives and laborers (semi-skilled and unskilled occupations) will fall by more than one-fifth so that by 1975 persons in these occupations will account for a considerably smaller proportion than in 1963. Core employment in 1975 of the poorly educated, low-skilled worker will thus be significantly reduced over that of today. This same pattern is expected for the Region as well.

* In addition, many workers move from one occupation to another, and vacancies created by this mobility also need to be filled. Unfortunately there is no good way to estimate replacement needs resulting from occupational mobility.

TABLE 6

NUMBER AND PERCENT CHANGE IN CORE EMPLOYMENT

BY OCCUPATION

1963 - 1975

<u>Occupation</u>	<u>1963</u> (000's)	<u>Percent</u> <u>Distrib.</u>	<u>1975</u> (000's)	<u>Percent</u> <u>Distrib.</u>	<u>Percent Change</u> <u>1963-1975</u>
Professional	91.0	16.4	102.9	19.5	+13.1
Managerial	54.8	9.9	48.9	9.2	-10.8
Clerical	127.8	23.0	129.4	24.4	+ 1.3
Sales	53.8	9.7	47.3	8.9	-12.2
Craftsmen	63.8	11.5	61.5	11.6	- 3.6
Operatives	80.6	14.5	62.3	11.8	-22.6
Service Workers	54.7	9.8	55.8	10.5	+ 2.0
Laborers	18.0	3.2	13.0	2.5	-27.0
Miscellaneous	<u>11.0</u>	<u>2.0</u>	<u>8.3</u>	<u>1.6</u>	<u>-24.6</u>
TOTAL	552.3	100.0	529.5	100.0	- 4.9

TABLE 7

MAJOR INDUSTRY SOURCE OF OCCUPATIONAL EMPLOYMENT

1975

<u>Selected Occupation</u>	<u>Major Industries Employing</u>	<u>Percent of Total Occupation in Major Industries</u>
Professional	Health, Public & Priv. Education, Legal and Government	72.5
Clerical	Wholesale, Retail, F.I.R.E.*, Government	61.0
Sales Workers	Printing & Publishing, Whole- sale, Retail, & F.I.R.E.	84.0
Craftsmen	Construction, Printing & Publishing, Wholesaling & Retail	53.5
Operatives	Food Mfgr., Apparel Mfgr., Transportation, Wholesale, Retail	57.0
Service Workers	Retail, Health, Public & Priv. Education and Government	78.2

* - F.I.R.E. is an abbreviation for industry group "Finance, Insurance, and Real Estate".

TABLE 8

GAP BETWEEN CORE RESIDENT LABOR FORCE AND CORE EMPLOYMENT BY OCCUPATION

1960-1975

<u>Occupation</u>	<u>1960 Labor Force Surviving Through 1975</u>	<u>1975 Emp.</u>	<u>Labor Needed</u>
Professional	29,315	102,972	73,657
Managerial	13,896	48,856	34,960
Clerical	31,905	129,389	97,484
Sales	14,527	47,321	32,794
Craftsmen	32,568	61,501	28,933
Operative	48,483	62,260	13,777
Service Workers	32,922	55,806	22,884
Laborers	<u>11,520</u>	<u>13,006</u>	<u>1,486</u>
TOTAL	215,136	521,111	305,975

For each occupation only a few broad industrial categories will account for most of the employment requirements, as shown in Table 7. This is important because it means that changes in occupations and their educational, training and skill requirements can be easily identified through good liaison between employers and those responsible for the education and training of the Core's labor force. The information in Table 7 also is important for it indicates the principal industries which need to be encouraged to grow within the Core.

Replacement Requirements Through 1975

Estimates of labor replacement requirements by occupation provide the essential dimension to manpower training and development. To portray training opportunities for Core residents over the 15 year period 1960-75, the 1960 resident labor force by occupation was considered as a "stock" which survives over the projection period, after accounting for separations from the labor force occasioned by deaths and retirements. New entrants or those reentering the labor force must make up for these separations. These sources of additional supply may come from either Core residents or suburbanites. The gap between the surviving resident labor force and the number of jobs required is shown by occupation in Table 8.

As a result of separations from the resident labor force, there will be a total net demand for additional workers of nearly 306,000 over the period 1960-75. Almost one-fourth of the total demand will be for professional-technical workers, such as teachers, nurses, social workers, medical records' technicians, occupational therapists, lawyers, judges, draftsmen, accountants, etc. Clerical occupations, such as bookkeepers, key-punch operators, telephone and key board operators, cashiers, typists, secretaries, computer operators, etc., will account for 32 percent of the replacement requirements. Operatives, such as power sewing machine operators, electronic assemblers, bus, truck and taxi drivers, deliverymen, etc., will comprise a mere 4 percent, and laborers of all kinds, a miniscule proportion of the total replacement requirements. Service workers such as policemen, firemen, guards, custodians, orderlies, messengers, licensed practical nurses, nurses aids, etc., will provide opportunities for nearly 23,000 persons, or 8 percent of the total requirement.

The question is whether the projected 164,400 entrants into the Core resident labor force will possess the education and training to gain access to the job openings which exist and will exist. In large measure this will depend upon the size and quality of the training programs, both institutional and on-job. For example,

clerical positions will have to be filled at the rate of 6,500 per year. Yet the Boston school system which has a large and effective business education program currently produces only an estimated 1,600 clerical graduates per year. The gap must be made up by other public training programs, the large number of private business and commercial schools, and probably by an expansion of the Boston school system program.

Meeting Manpower Requirements

1. Education

The educational system is the key to the preparation of Core citizens for participation in the world of work. The Core school systems must continually improve in quality, especially in low-income and minority neighborhoods. To meet the diverse needs of Core residents, Core communities (as well as those of the region and the Commonwealth) must be prepared to spend far more per pupil than would be expected in the best suburban school system.

The best time in the educational process to overcome the problem of diversity of background of incoming students and to exploit the natural advantages of incoming students is in the elementary school years. The success of programs such as Head

Start and early remedial programs has been marked. However, these programs must be continued into the regular elementary school curricula. But the elementary school system must also provide programs for gifted children who learn more quickly than the average.

Several new educational approaches should be considered by Core communities to meet the diverse needs of the population. First, serious consideration should be given to the establishment of a regional technical school district. A number of other communities in the Region have joined together to create such districts. Several advantages would seem to be associated with such a technical school district: avoidance of duplication of facilities, equipment, curricula and faculty; ability to better provide for the most up-to-date equipment and techniques; ability to utilize more effectively existing top-flight instructors and to hire needed talent; ability to enlarge and develop better in-depth vocational counseling; an opportunity to tie in the residential program under the 1964 U.S. Vocational Education Act for youth from low-income, slum neighborhoods throughout the Core; ability to offer a wider range of occupational training; and increased ability to experiment with instructional approaches and to adopt the more successful ones.

Second, serious consideration should be given to the creation of a science supplementary educational center jointly sponsored by the six Core communities. Such a supplementary educational center could be funded under Title III of the Elementary and Secondary Education Act of 1965 (PL 89-10).

The increase in science "literacy" resulting from establishment of such a center would directly contribute to the needs of Core employers for persons with skills and training which have a scientific orientation. Indeed, an increasingly larger share of our political, social and economic life depends upon scientific inquiry and discovery. All students require direct experience with the methods and concepts of science to be able to have an effective role in their world. Scientific "literacy" is fast becoming a requirement for all citizens. However, science instruction is changing faster in content and techniques than any other field of instruction. Thus, the need for a supplementary center to keep abreast of these changes.

The primary purpose of such a supplementary center would be to improve science instruction for all groups at all levels of intelligence. The concept of the supplementary center should emphasize three points:

1. The center should supplement and strengthen science instruction in all Core community schools.
2. All pupils should have access to the programs and resources of the center.
3. The center should seek to provide comprehensive improvements in science "literacy" and science instruction rather than attempt to produce science specialists.

Some of the reasons for sending students and teachers to the science supplementary educational center are:

- Availability of new materials and scientific opportunities not found in the home school.
- Contact with industrial and university research specialists who are skilled in the frontier areas of science.
- Opportunity for students to participate actively by conducting their own scientific experiments rather than passive, "come-and-see type" programs which are not geared for large-scale student experimentation in the sciences.
- An opportunity for students to explore the whole scientific experimental process related to frontier areas of new manpower needs, etc.

- An opportunity to provide a creative atmosphere for motivating students and imparting scientific literacy.
- An opportunity to up-date teachers' knowledge through in-service training.
- An opportunity for shared time learning situations with children from other public and private schools in the Boston area.

A science center would offer a real opportunity to break away from a subject by subject approach and to develop a science curriculum around broad, functional areas of learning (for example, terrestrial Sciences; Marine Sciences; and, Space Sciences). Each of these areas can be subdivided into the traditional academic scientific disciplines, i. e., physics, chemistry, mathematics, sociology, etc. Close affiliation could be maintained with such institutions as the Museum of Science, MIT, Boston College, Boston University, Northeastern, Harvard, etc., and Federal agencies such as NASA and ESSA.

Third, an educational system which stops at high school will not meet the increasing demands for higher skills. A public two-year post high school system, specifically oriented

toward occupational training should be established for the Core. Such a system might very well combine job experiences with the institutional or classroom training in order to better prepare the student for the realities of the world of work. While the main source of enrollment would be expected to be high school graduates, this new system should also be geared to handle adults who have been out of school for some time, including those who may have failed to complete high school. In other words, the proposed system should have the adaptive and innovative capacity to meet the needs of residents which are now being partially met by the establishment and operation of Opportunities Industrialization Center. This proposed two-year system might also be the center for providing retraining and refresher programs for those re-entering the labor force, especially women. While the emphasis in such cases would be on updating existing skills, opportunities could be provided for advancement. It may well be that any two-year, post high school system should be part of a regional technical school district. Such regional technical schools can provide for grades 13 and 14.

Fourth, a standard 2-year community college system whose graduates go on to regular four-year degree granting institutions will be required. Further study is required in order to deter-

mine whether the establishment of the Massachusetts Bay Community College in Charlestown will be sufficient to meet the needs of the Core.

2. Manpower Plan Required

A wide variety of manpower training programs now exists. These include MDTA institutional training, OJT (on job training), Neighborhood Youth Centers, Job Corps, Opportunities Industrialization Center, special counseling and guidance programs. Within these broad programs, projects are geared to meet the needs of high school dropouts, women reentering the labor force, middle-aged chronic unemployed, older unemployed. This wide variety of programs is important to developing Core manpower resources. There is some evidence to suggest that the on job training programs may be particularly valuable in this regard. However, projects range greatly in resources devoted to them and the number of persons trained, and are developed and conducted by a number of different organizations, in many instances in isolation from each other. In addition, the individual manpower projects frequently do not involve the totality of approach required to meet the individual trainee's needs. Also, there is an inadequate relationship between the projects and resources committed to them and the magnitude of need of the different groups in the labor force.

What is needed is a comprehensive manpower plan for 1975 prepared jointly by the Core communities. The employment and broad occupation projections presented previously would be inputs to such a planning effort. Such joint manpower planning over the next few years will become even more important because of the Model Cities program. A manpower plan should also spell out the program and resources required annually. This one-year plan should then be fed into the annual plan being prepared on a Federal-State interagency basis by the Boston SMSA Area Coordinating Committee under the chairmanship of the Boston district director of the Massachusetts Division of Employment Security. The MAPC could be the coordinating vehicle for the six Core communities.

3. Industrial Development

To achieve the projections of employment opportunities presented earlier will require a vigorous, coordinated program to stimulate the necessary investment. The level of employment projected would appear essential to providing the economic climate necessary to assure that every person capable of gainful employment can find a job suitable to his talents.

Among the approaches which should be considered for implementation are:

→ . Creation of a "one-stop" service to business

All too frequently business inquiries concerning zoning changes, expansion plans, availability of sites, off-street parking and loading, vandalism and the host of details involving the operations of business and its relationship to laws and ordinances require contact with a host of municipal departments and agencies. Sometimes there is an unnecessary referral by one agency to another agency or one employee to another, and in many instances inadequate assistance is given.

A special division, perhaps within the mayor's office, is needed to look after the special needs of business and industry and their inquiries. Such a "one-stop" service center would track down all the necessary information for business and industry, would alert all appropriate departments as to actions to be taken and would follow-up to assure that any such actions were quickly and effectively carried out. New York City set up such a system last year; and the City of Philadelphia has an industrial development corporation, an industrial liaison office, and a development coordinator who help business and industry.

→ . Creation of an Industrial Development Corporation

The Core communities should provide the leadership for the establishment of a development corporation. Such a corporation would have the functions of: providing coordinated assistance to private development; identifying specific growth and/or expansion opportunities; supplying or assisting in obtaining of high risk financing for creation of new businesses or new developments; and the rehabilitating of industrial and commercial structures to meet the modern needs of business and industry. In addition, such a corporation could be most instrumental in developing specific training projects to meet the needs of any given industry. Most importantly, such a corporation could provide extensive services and programs to the large number of new and existing small businesses which often suffer from a lack of management know-how by taking advantage of the Small Business Administration programs as well as technical assistance from the Economic Development Administration, especially through its newly-organized Urban Projects Division.

→ . Creation of a Core Industrial Development Finance Agency

The Massachusetts House of Representatives has recently passed a bill which would permit a community or group of

communities to float revenue bonds for a given industrial project. In the event that this bill becomes law, consideration should be given to the joint creation of an industrial development finance agency as provided for under the legislation. Such a finance agency would in no way duplicate the functions of the proposed industrial development corporation outlined above. Consideration might be given to amending this legislation to broaden the definition of manufacturing to include activities which are important to the economic structure of the Core.

→ . Rehabilitation of Industrial-Commercial Buildings

Less than 1.5 million square feet of industrial floor space is currently available to handle the projected relocation and growth needs of 10-12 million square feet of space by 1975. To meet a substantial portion of this need, rehabilitation of existing structures, as well as new construction will be required. Rehabilitation also would provide incubator space for newly-formed business, which would provide potential employment expansion opportunities.

While there are several examples of imaginative and reasonably-priced private efforts, a more systematic and overall approach is required. While such a program could be initiated by each individual community, and certainly their support is essential, the best agency for directing the implementation of such a program within the Core would be the Industrial Development

Corporation proposed above.

The real estate unit of such a Development Corporation could also assist in providing space for displaced establishments. For example, it is estimated that apparel firms employing some 3,000 workers will be displaced from their present location. Clearly, this is a sufficiently-large component to warrant serious consideration of the development of an apparel center to house these establishments. A development corporation with a real estate subsidiary patterned after the Philadelphia corporation could be of great assistance in such an undertaking.

• Reservation of Publicly-Owned Surplus Land for Industrial Development

One factor contributing to the general outward movement of industry from the Core, and especially Boston, is the difficulty of land assembly. Unless measures can be formulated which will assist firms in finding space in the Core when they need it, the suburbs will continue to offer overwhelming locational attractiveness for both the expansion of existing establishments and the development of new operations.

The establishment of an industrial land-bank appears to be a principal means of making space readily available in the built-up, land-short communities of the Core. Creation of an industrial land-bank requires identification of appropriately located, publicly-owned surplus land and its reservation for industrial

uses. Additional land should be made available through appropriate zoning changes after surveys to identify suitable parcels. Consideration should also be given to identifying selected locations for development over expressways or local streets, especially in urban renewal areas, in order to take advantage of Federal aid for cost of constructing foundations.

. Enlarged Industrial - Commercial Renewal Programs

The other principal means of providing land for expansion is through urban renewal. In general the renewal effort should be aimed at assisting existing firms to meet their expansion needs in place, and only to a limited extent for relocation. Because of the growth in employment opportunities offered by universities and hospitals, institutional renewal should be given an important allocation of total renewal resources.

Renewal will be an important tool in up-grading and modernizing, not only downtown Boston, but major outlying centers. Without provision for off-street parking and new efficient floor space, many of these centers will decline in the face of competition from regional, subregional and neighborhood planned shopping centers. Frank recognition of the need of reducing the amount of floor space as well as modernizing and constructing new stores in many of the older centers will be required if they are to remain competitive.

. Improvement of Transportation Facilities

The type, extent, and location of transportation facilities will strongly influence the type and magnitude of industrial-commercial activity which locates and remains in the congested area. The increase of commuters into the Core implied by the projections shown in Table 3 indicates a need to improve transportation and parking facilities. The rapid completion of the extensions proposed under the MBTA Master Plan will be an important component in the provision of needed facilities.

* * * * *

Undertaking the kind of manpower and industrial development approaches recommended above will make an important contribution to improving the conditions of the Core. The underlying theme of the proposals is that solutions will be easier and more effective if the Core municipalities coordinate their programs.

APPENDIX

CORE INDUSTRY GROUPS

<u>SIC #</u>	<u>Industry</u>
10-14	Mining
15-17	Contract Construction
20	Food and Kindred Products
22	Textile Mill Products
23	Apparel and Other Finished Products
26	Paper and Allied Products
27	Printing Publishing and Allied Industries
28	Chemicals and Allied Products
29	Petroleum Refining and Related Industries
30	Rubber and Miscellaneous Plastics Products
31	Leather and Leather Products
24	Lumber and Wood Products, except Furniture
25	Furniture and Fixtures
32	Stone, Clay and Glass Products
33	Primary Metal Industries
34	Fabricated Metal Products, except Ordnance, Machinery, etc.
35	Machinery, except Electrical
36	Electrical Machinery, Equipment, and Supplies
37	Transportation Equipment
38	Professional, Scientific, and Controlling Instruments
39	Miscellaneous Manufacturing Industries
41-47	Transportation, except Railroads
48	Communication
49	Electric, Gas, and Sanitary Services
50	Wholesale Trade
52-59	Retail Trade
60-62,	Finance, Insurance, and Real Estate
64-67	
63	Insurance Carriers
70	Hotels, Rooming Houses, etc.
72	Personal Services
73	Miscellaneous Business Services
76	Miscellaneous Repair Services
78	Motion Pictures
79	Amusement and Recreation, except Motion Pictures
80	Medical and Other Health Services

CORE INDUSTRY GROUPS (Continued)

<u>SIC #</u>	<u>Industry</u>
81	Legal Services
82	Educational Services
86	Nonprofit Membership Organizations
89	Miscellaneous Services
91	Federal Government
92	State Government
93	Local Government

APPENDIX TABLE 1

Core Employment

<u>SIC #</u>	<u>1950</u>	<u>1963</u>	<u>1975</u>	<u>1990</u>
10-14	743	76	*	*
15-17	28,281	23,773	21,800	26,400
20	25,696	19,888	13,600	12,800
22	10,226	2,290	500	400
23	24,314	17,523	13,400	13,200
26	3,812	2,605	2,100	2,400
27	18,367	16,144	15,300	18,300
28	7,803	5,417	4,100	3,900
29	753	265	600	200
30	5,733	3,149	1,700	1,800
31	14,249	6,859	4,200	4,200
24	1,354	510	100	200
25	3,742	1,959	1,200	1,500
32	1,733	1,389	1,400	1,200
33	9,267	3,264	1,200	1,200
34	9,962	8,805	8,200	12,700
35	13,760	4,962	1,900	2,400
36	10,755	8,616	8,400	9,600
37	12,624	10,697	7,300	7,200
38	3,828	5,728	8,600	9,600
39	6,170	3,936	3,400	3,100
41-47	25,596	20,226	17,800	19,800
48	11,447	12,266	13,500	13,500
49	9,846	6,320	5,200	3,700
50	54,692	46,739	46,400	58,700
52-59	111,568	80,211	71,200	79,600
60-62	30,152	34,921	38,100	61,500
& 64-67				
63	20,823	25,190	24,000	27,800
70	6,461	6,297	6,800	8,000
72	11,856	8,710	7,100	7,800
73	7,833	17,433	10,900	11,600
76	1,713	1,328	900	1,000
78	4,238	2,619	1,300	1,700
79	4,676	2,919	1,400	1,600

* Denotes figure less than 50

APPENDIX TABLE 1 (Continued)

<u>SIC #</u>	<u>1950</u>	<u>1963</u>	<u>1975</u>	<u>1990</u>
80	17,580	26,415	32,100	45,600
81	2,779	3,661	5,100	8,400
82	37,456	30,162	31,100	42,300
86	9,164	11,968	3,000	3,800
89	5,661	9,980	15,100	28,900
91	10,009	20,555	30,200	35,800
92	9,482	14,661	27,500	29,800
93	25,419	21,870	21,800	27,500
<u>TOTAL</u>	631,643	552,306	529,500	650,700
Growth Index	.874	.959	1.229	
Relative Index	.777	.818	1.028	
Core Employment Percent of Region's Total	55.3	43.0	35.1	36.1

APPENDIX TABLE 2

Absolute and Relative Growth Index 1950-1963

	Core Absolute Growth <u>Index</u>	Core Index Relative to <u>Planning Area</u>	<u>SMSA</u>
10-14	.102	.136	.156
15-17	.812	.755	.785
20	.744	.942	.981
22	.224	.655	.406
23	.721	.852	.725
26	.683	.601	.662
27	.879	.810	.867
28	.694	.819	.859
29	.352	.351	.616
30	.544	.505	.560
31	.481	.698	.748
24	.377	.471	.505
25	.524	.623	.776
32	.802	.802	.984
33	.352	.432	.644
34	.884	.693	.729
35	.361	.278	.221
36	.801	.456	.511
37	.847	1.086	1.120
38	1.496	.878	.864
39	.638	.274	.751
41-47	.790	.705	.714
48	1.072	1.190	1.634
49	.642	.677	.660
50	.855	.754	.622
52-59	.719	.660	.681

APPENDIX TABLE 2 (Continued)

Absolute and Relative Growth Index 1950-1963

	Core Absolute Growth <u>Index</u>	Core Index Relative to <u>Planning Area</u>	<u>SMSA</u>
60-67, less 63	1.158	.817	.782
63	1.210	.787	.834
70	.975	1.002	.999
72	.735	.809	.815
73	2.226	.550	.578
76	.775	.736	.813
78	.618	.966	.948
79	.624	.795	.833
80	1.503	.803	.839
81	1.317	.948	.956
82	.805	.489	.481
86	.306	.209	.267
89	1.763	.750	.754
91	2.054	1.760	1.600
92	1.546	1.367	1.417
93	.860	.719	.733

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1950-1990.

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